

US006819630B1

(12) United States Patent

Blackmon et al.

(10) Patent No.:

US 6,819,630 B1

(45) Date of Patent:

Nov. 16, 2004

(54) ITERATIVE DECISION FEEDBACK ADAPTIVE EQUALIZER

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: 10/666,829

(22) Filed: Sep. 18, 2003

Related U.S. Application Data

(60) Provisional application No. 60/412,432, filed on Sep. 20, 2002.

(51) Int. Cl.⁷

H04B 11/00

(52) U.S. Cl.

367/134; 375/233

(58) Field of Search

(56) References Cited

U.S. PATENT DOCUMENTS

5 301 167	A	*	4/1994	Proakis et al	367/134
5 550 757	Α.	*	9/1996	Catipovic et al	367/134
5 844 951	A	*	12/1998	Proakis et al	375/233
6,295,312	Bi	*	9/2001	Jarvis	367/134

* cited by examiner

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(57) ABSTRACT

The present invention provides a receiver for underwater acoustic telemetry which combines a decision feedback adaptive equalizer structure with a modified turbo-equalizer structure. The modified turbo-equalizer structure is of significantly reduced complexity because the decision feedback adaptive equalizer structure is operable to process a plurality of data channels to provide a single symbol data output stream for application to the input of the modified turbo-equalizer which uses a decision feedback equalized, interleaver, deinterleaver and a decoder. Either a hard viterbidecorder for single iteration processing or a soft in/soft out decorder such as a MAP decoder for multiple iteration can be used. The iteration provide improved performance compared to a normal DFE and lower complexity compared to the traditional turbo-equalizer.

20 Claims, 4 Drawing Sheets

